

REMARKS

Claims 1-15 are pending. New claims 8-15 have been added. No new matter has been added by way of these amendments. For instance, new claims 8-15 are supported by the present specification at page 6, line 34 to page 7, line 6. Accordingly, no new matter has been added.

In view of the following remarks Applicants respectfully request that the Examiner withdraw all rejections and allow the currently pending claims.

Issues Under 35 U.S.C. §102(e)

The Examiner has rejected claims 1-7 under 35 U.S.C. §102(e) as being anticipated by Mitsui, USP 6,037,083 (hereinafter referred to as Mitsui '083).

The Examiner has also rejected claims 1-7 under 35 U.S.C. §102(b) as being anticipated by Alpay et al., USP 5,415,953 (hereinafter referred to as Alpay '953).

Applicants respectfully traverse each of the above rejections.

Description of the Present Invention

The present invention provides a photomask blank and a photomask of quality which have uniform film properties and avoid any degradation of cross-sectional shape caused by differential etch rate between the light-shielding film and the antireflective

film. The present invention also provides methods for preparing the photomask blank and the photomask.

It has been found that when a light-shielding film and antireflective film, made of for instance, chromium oxynitride carbide, are deposited on a transparent substrate by effecting reactive sputtering, the uniformity of optical properties within the substrate plane are improved by using a target of chromium or chromium containing at least one element of oxygen, nitrogen and carbon and a sputtering gas containing at least carbon dioxide gas, a nitrogen-containing gas and an inert gas. This enables controlled deposition of the chromium base film and mass scale production in a consistent manner, ensuring that a high quality chromium base film of chromium oxynitride carbide is obtained. At the same time, the concentration of carbon atoms in the chromium oxynitride carbide is reduced stepwise or continuously from the surface toward the substrate, which allows control of the etch rate, successfully overcoming the above-mentioned problems.

Distinctions Between the Present Invention and Mitsui '083

Mitsui '083 discloses a halftone phase shift mask blank comprising:

- a transparent substrate;
- a halftone material film laminated on said transparent substrate; and
- a metal film laminated on said halftone material film.

According to Mitsui '083, the metal film is configured with materials having differing etching rates, as the etching proceeds from the surface side toward the transparent substrate side, either in stages, or continuously, or partly in stages and partly continuously. The etching rate is set so as to become faster, as the transparent substrate side is approached from the surface side, either in stages, or continuously, or partly in stages and partly continuously.

However, the halftone material film typically has molybdenum and silicon. These are different from the present light-shielding film and the antireflective film formed of a chromium base material, typically a chromium oxynitride carbide. Accordingly, Mitsui '083 fails to suggest or disclose the presently claimed invention. Thus, no anticipation exists based upon Mitsui '083.

Distinctions Between the Present Invention and Alpay '953

Alpay '953 discloses a transmissive embedded phase shifter-photomask blank for a selected lithographic wavelength comprising an optically inhomogeneous attenuating film with an upper and lower surface, having a transmission of at least 0.001 at the lithographic wavelength and consisting essentially of a combination of at least two components, at least one of the components having a higher absorbance than that least one other component at the lithographic wavelength. According to Alpay '953, one depth from the upper surface of the film has a higher

content of said higher absorbing component than another depth from the upper surface, and the profile of change in the refractive index, the profile of change in the extinction coefficient or both of said profiles is gradual through the film thickness. Additionally, the profile of change and the film thickness are selected to provide a phase shift of about 180° , or an odd multiple thereof, at the selected lithographic wavelength.

Although Alpay '953 discloses that the components are M-O-C-N materials, M-Cl-O-C-N materials, M-Cl-F-O-C-N materials or M-F-O-C-N materials wherein M is selected from the group consisting of Cr, Fe, Mo, Zn, Co, Nb, Ta, W, Ti, Al, Mg, Si, and mixtures thereof, it fails to disclose and teach that the content of carbon decreases stepwise or continuously from the surface side toward the substrate. Further, note that Fig. 1 of Alpay '953 apparently does not show the content of carbon decreases stepwise or continuously from the surface side toward the substrate.

Accordingly, Alpay '953 fails to suggest or disclose the presently claimed subject matter. Thus, no anticipation exists based upon the Alpay '953.

In view of the above, Applicants respectfully submit that the present claims define subject matter which is allowable over the cited art. Accordingly, the Examiner is respectfully requested to withdrawal all rejections and allow the currently pending claims.

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Request for Initialled Form PTO-1449


On February 13, 2002, Applicants filed an Information Disclosure Statement (IDS) with a Form PTO-1449 attached thereto. Listed on this Form PTO-1449 were references. However, the Examiner has not yet returned the initialed copy of this February 13, 2002 IDS Form PTO-1449. Thus, Applicants respectfully request that the Examiner return the initialed copy of this Form PTO-1449 indicating that the references have been considered.

If the Examiner has any questions or comments, please contact Craig A. McRobbie, Registration No. 42,874 at the offices of Birch, Stewart, Kolasch & Birch, LLP.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17; particularly, extension of time fees.

Respectfully submitted,

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